46. The Marine Fauna of British East Africa and Zanzibar, from Collections made by Cyril Crossland, M.A., B.Sc., F.Z.S., in the Years 1901–1902. Bryozoa—Cyclostomata, Ctenostomata, and Endoprocta. By Arthur Wm. Waters, F.L.S., F.G.S.*

[Received May 19, 1914 : Read June 9, 1914.]

(Plates I.–IV.† & Text-figure 1.)

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The present paper continues the series on the collections made by Mr. Crossland in the tropics. The first was on *Tubucellaria*, published in the Journal of the Linnean Society, vol. xxx. 1907; then two parts in the 'Reports of the Sudanese Red Sea,' *ibid.* vol. xxxi. 1909, and vol. xxxi. 1910; and the Cheilostomata from British East Africa and Zanzibar in the 'Proceedings' of the Zoological Society, 1913.

The bibliographical references are pretty full in order that, so far as the tropics are concerned, they may be used as a continuation of Miss Jelly's Catalogue.

It should not be forgotten that all the specimens dealt with in this paper are from but a very slight depth (up to 10 faths.), so that but few Cyclostomata would be expected, since they mostly occur at considerable depths.

Points of Special Interest.

The ovicells of *Entalophora*, and of *Idmonea radians* Lam., have been studied full of embryos, and the œciostome has been cut through. In *Idmonea radians* the ovicells form lobes between each series of zoœcia. The ovicells must be more used in classification, and the primary zoœcia and the early stages must be examined.

The rosette-plates of Reichert in *Zoobotryon*, instead of having a number of pores round a central pore, as described, have a central pore and 8–9 cells round the pore. The mass of cells in the neighbourhood of the pore are dealt with.

27 species or varieties are mentioned in this communication,

* Communicated by Cyril Crossland, M.A., B.Sc., F.Z.S.

† For explanation of the Plates see p. 857.

and 76 were described in the previous one, making 103 in all; of these 37 are known from the Atlantic, 22 are British, 31 Mediterranean, 37 are known from the Indian Ocean, 14 from S. Africa, and 51 from Australia.

Table of Distribution.

Page		Atlantic.	British.	Mediterranean.	Red Sea.	Indian Ocean.	S. Africa.	Australia.	Fossil.	
837	*Crisia denticulata* (Lamk.) ..	+	+	+	+	...	+	+		
838	„ *elongata* M.-Ed.	...	...	...	.	...	+			
839	„ *sertularoides* (Aud. & Sav.)	...	...	+						
839	„ *inflata*, sp. n.									
840	„ *circinata*, sp. n.									
840	*Entalophora wasinensis*, nom. n.	+								
842	*Filisparsa tubulosa* (Busk) ..	+ B	.	+	+	...	...	+	+	
843	*Terria irregularis* (Meneg.) ...	+	.	+	...			+	+	
844	*Idmonea milneana* d'Orb.	+	+	+	...	+ N	...	+	+	Pacific.
844	„ *radians* (Lamk.)	...	...		.		...	+	+	
846	„ *interjuncta* MacG. ...	...	...	...	...	...	..	+		
847	*Amathia lendigera* (L.)	+	+	+	..	...	+	+		
847	„ *semicomvoluta*(Lamx.)	...	..	+						
848	„ *distans* Busk.....	.		..		..	..	+		
848	„ *vidovici* (Hell.)	+	.	+	...	...	...	...		Roscoff.
849	*Zoobotryon pellucidum* Ehr. ..	+		+	+	..	...	+		Isle of Pines.
851	*Bowerbankia pustulosa*(E.&S.)	..	+	+						
851	*Mimosella bigeminata*, sp. n. .									
852	*Mimosella* sp.									
852	*Farrella atlantica* Busk	+	...	+	.	+				
853	*Valkeria uva* (L.)	+	+	+	+	...	...	.	. .	China Seas.
854	*Cylindræcium giganteum* (B.)	+	+	+	+	+	...	...	.	Queen Charlotte I.
854	*Buskia nitens* Alder	...	+	.	...	..	...	..	...	Arctic, Q. Charlotte I.
854	*Pedicellina spinosa* (Rob.) ...	...	...	..	...	..	...	.	...	California.
855	*Barentsia gracilis* (Sars)	+	+	+	+	...	...	+		
855	*Loxosoma singulare* Kef.	+	+	+						
856	*Lepralia poissonii* Aud.	+	...	...	...	+	...	+	...	Japan.
856	*Beania intermedia* Hincks.....	...	...	...	...	+	...	+		

Levinsen * quotes Norman with regard to zoarial and zoœcial characters, who says: "Why also in all instances is the ultimate growth and form of the zoarium to be excluded from generic characters among certain families of the Cheilostomata, and at the same time to be recognised among the Cyclostomata and Ctenostomata, and even some other groups of Cheilostomata?"

Few characters have been available in the Cyclostomata, and those mostly zoarial ones, so that the classification of the group is still in a somewhat hopeless condition, whereas in the Cheilostomata very many characters are now used, and the classification is gradually becoming more natural. It is therefore to the more

* Morph. and Syst. Studies on the Cheil. Bryozoa, p. 69 (1909).

highly differentiated Cheilostomata that we must at present look for guidance, rather than to the simpler Cyclostomata.

There are, however, some characters in the Cyclostomata, which when more used will help to show which forms are nearly related. Smitt showed that the ovicells furnished important characters, and on several occasions I have pointed out the importance of the ovicells, and of what I called the peristome of the ovicellular opening, saying in 1888* that "the position and nature of the opening is most important, often more so than the shape of the ovicell." Harmer has confirmed what I said, and in several very valuable papers has gone into detail in some genera, and has named the passage by which the larva escapes the œciostome, while the external orifice is the œciopore, which terms are generally accepted, though unless new terms are absolutely necessary they are always to be regretted, as every branch of science is now overloaded with names. Also the size of the embryo, and of the zoœcial aperture, as well as the position and nature of the closures, give specific or generic characters.

The primary zoœcium and the growth of the younger part of the zoarium must receive much more attention, in fact up to the present in recent forms it has received hardly any: for example, in *Entalophora proboscidea*, *E. deflexa* Couch, and *Filisparsa tubulosa* there is a *Stomatopora*-like growth often spreading for a considerable distance over the supporting material, before the zoarium becomes erect, whereas in what has been considered to be *Entalophora rugosa* d'Orb., from Naples, there is a *Diastopora*-growth often covering a considerable piece of the stone or shell upon which it grows before the erect cylindrical zoarium is formed. It is elsewhere shown that other characters, namely the lamina and ovicells, prove that it belongs to the Diastoporidæ.

To return to the more highly differentiated Cheilostomata: in various genera the zoarium may be either adnate, erect, uni- or bilaminate, or even articulated. For example, *Lepralia*, *Schizoporella*, Celleporidæ, all occur adnate, erect, uni- and bilaminate, while *Thalamoporella* may be unilaminate, bilaminate, adnate or erect and articulated; Cellaridæ in recent forms are usually articulate, except in the younger branches, but in fossils frequently there is no articulation. Now in none of these cases is there any material difference in the zoœcium according to the way in which the zoarium grows.

It is sometimes forgotten that all this only deals with the position of the zoœcia, or, as Levinsen would say, the "autozooids," and this has proved of quite secondary value in classification; but this does not mean that characters furnished by the other "zooids" such as avicularia, stalks, stolons, radicles etc., which also cause differences in the form of the zoarium, may not furnish valuable characters.

No doubt the Catenicellidæ are derived from unarticulated

* "On some Ovicells of Cyclostomatous Bryozoa," Journ. Linn. Soc., Zool. vol. xx. p. 276.

forms, but evidently this is a long way back, so that now articulation is apparently a generic character; but there must have been a time when closely related forms were in some cases continuous, in others articulated, but now both zoarial and zoœcial characters indicate a group of Catenicellidæ. In Cellaridæ and *Thalamoporella* the articulation is more recent, and should not be made a generic character.

Examining the Cyclostomata in the same way, we find to a certain extent parallels with the Cheilostomata: *Diastopora*, or perhaps we should say Diastoporidæ, occurs adnate, but also bilaminate in such forms as *D. intricaria*, *Mesenteripora*; and some forms now placed with *Entalophora*, such as *E. regularis* MacG., belong to this family. Even the *D. obelia* division, which it has been proposed to raise to a genus *Diplopora* *, has adnate forms, as well as the erect fossil *Diastopora brendolensis* Waters †, with tubules between the zoœcia. A *Stomatopora*-like growth may become erect, and too much importance has been attached to whether a form is adnate or erect. There are adnate forms with Heteroporidan structure, and some bilaminate as *Favospira*.

The ovicells together with the oœciostomes etc. are, as stated, going to assist us to trace relationship, but to what extent we cannot yet say, as our knowledge is in most families very incomplete, often fragmentary or absent. However, although only sufficient to show the direction in which work is wanted, it may be useful to put together what I have gathered from my own collection and from published accounts of recent forms.

In *Crisia*‡ the ovicells of most species are known, and they with the oœciostomes furnish most useful characters in determination. In the species examined there are 8–9 tentacles.

In *Idmonea*, as at present understood, there are some important and rather puzzling differences in the ovicells. There is, First, the *I. radians*, mentioned in this paper, also *I. atlantica* Forbes, *I. concava* Reuss, and *I. parasitica* Busk, in which the oœciostome occurs on one side, usually on the second of the series enveloped by the ovicell, and by the first or second zoœcium counting from the median line; the tube curves over and turns downwards (Pl. II. fig. 6, *œ.*). In these the ovicell spreads across the anterior surface.

Second. There may be merely an anterior inflation, usually near to a bifurcation, with a central oœciostome, as *I. interjuncta* MacG.

Third. I have a fragment of an *Idmonea*, probably *australis*

* This name cannot stand as it has already been used, see page 836.

† Quart. Journ. Geol. Soc. vol. xlviii, p. 155, pl. iii, fig. 1 (1892).

‡ Reuss (Foss. Polyparien des Wiener Tert. p. 99) described the Cyclostomatous ovicells as *Cœlophyma*, of which *C. glabrum* occurred on *Crisia hörnesi* (a *Crisia*), *Retepora disticha* (apparently *Idmonea*), and *R. cancellata* (do. *Idm.*); and *Cœlophyma striatum* on *Hornera hippolithus*.

Hagenow (Bry. Maest. p. 105) described *Cœlophyma lævis* on *Truncatula repens* and *T. truncata*; *C. constrictum* on *Idmonea tetrasticha* (this is not *Idmonea*, perhaps a worn *Truncatula*); and *C. granulatum* on *Idm. lichenoides*. Gregory does not quote Hagenow quite correctly.

MacG., in which the ovicell spreads over three or four series on one side only of the median line.

Fourth. There is the very curious ovicell standing erect and embracing the zoœcia of a series, which I described * as occurring in *I. meneghini* Hell., but from an examination of more material I came to the conclusion that it was *I. triforis* Hell., and a co-type has confirmed this conclusion. As described, there was little to distinguish *I. meneghini* Hell. from *I. triforis* Hell. except size, so that without a fair amount of material they were not readily distinguished.

The zoœcial aperture of *Idmonea* varies from 0·06–0·2 mm.

The so-called *I. irregularis* Meneghini has the ovicell dorsal, and must be removed to *Tervia*. It has 13 tentacles.

In *Tubulipora* there is an anterior ovicell spreading among many zoœcia, with the oœciostome usually close up to a zoœcial tube. Zoœcial aperture 0·07–0·18 mm. Tentacles 11–12. The colony is, where attached, often provided with small projections or even long multitubular radicles, so that the attachment is but slight, whereas in *Stomatopora* it seems to be very close.

In *Filisparsa* there is an anterior ovicell. 14 tentacles.

In *Entalophora* few ovicells have been seen. In the *proboscidea* group they are not very large, and are near to several zoœcial tubes without enclosing them. In *wasinensis*, the species described in this paper, the ovicell is very long and contains a considerable number of embryos. However, under *Entalophora* many species have been included which have a distinct lamina, and in these the ovicells found are of the *Diastopora* type, and suggest that they are erect cylindrical *Diastopora*. *Entalophora regularis* MacG., and what I called *E. rugosa* d'Orb., from the Mediterranean, must be removed on this account from *Entalophora*.

The zoœcial aperture of *Entalophora* is 0·07–0·19 mm. The number of tentacles is 12–16.

Diastopora. The ovicell is vesicular, as an irregular or subglobular elevation, often involving many zoœcia, and sometimes situated tangentially to the colony. The ovicell may spread internally with many arms, as in *D. intricaria* Smitt†. So far as seen, the oœciostome of *Diastopora* is a small plain tube, usually directed proximally. The zoœcial aperture is 0·06–0·11 mm.‡ The number of tentacles counted is 10–12. The ovicells of a very considerable number of fossil *Diastoporæ* have been figured, and the genus was abundant in the Jurassic and Cretaceous periods, and occurs as *Berenicea consimilis* Lonsdale, in the Silurian (see fig. in Bassler, "Bry.-Fauna of the Rochester Shale," p. 16, pl. v. figs. 1–5, 1906).

* "Ovicells of Cyclost. Bryozoa," Journ. Linn. Soc., Zool. vol. xx. p. 278, pl. xiv. fig. 2 (1888).

† Waters, "Bryozoa from Franz Josef Land," Journ. Linn. Soc., Zool. vol. xxix. p. 173, pl. xix. fig. 12 (1901).

‡ In some fossils the orifice is larger, see Canu.

Diastopora with tubules has been called *Diplopora*, a name already used for a calcareous alga. MacGillivray made a genus *Diplopora*, but finding the name occupied changed it to *Diploporella*; the name *Diplopora* has also been given for two or three other things. The group, however, occurs incrusting and bilaminate. The family Diastoporidæ will probably be found to be more distinctly separated than any of the others.

Hornera. The ovicell is a large subglobular, dorsal or somewhat lateral chamber with large pits and a lateral oœciostome. Tentacles, 9 in species examined. The "*Hornera eburnea*" Jull. & Calv. has a most curious anterior ovicell, but I do not see why it is placed with *Hornera*; also the *Hornera gravieri** Calv. seems to have a somewhat similar ovicell. Zoœcial aperture of *Hornera* 0·04–0·12 mm.

Discotubigera (*Defrancia*). Tangential ovicell with oœciostome near the distal border. One specimen has the ovicell the whole way round the periphery. No doubt many species have been placed under *Lichenopora*.

Stomatopora. Although many *Stomatoporæ* have been figured and described, but very few ovicells have been seen, and Smitt† said no species were known with ovicells. In *S. divergens* Waters‡, the ovicell is a small round elevation on the anterior surface. In *S.* (?) sp. from Plymouth the ovicell is at the end of an erect branch as in *Supercytis*. In *S. major* Johns., the anterior ovicell has a small plain tube for the oœciostome.

The *S. compacta* Norm. is *Diastopora*, and has the ovicells raised in between the openings of a small number of zoœcia, or is tangential, with the oœciostome as in *Diastopora*. Norman's specimens examined are now in the British Museum.

Lichenopora. Ovicell central and spreading between the rays. Oœciostome erect, plain or funnel-shaped; or a plain horizontal tube low down near the edge of the ovicell. There may be many oœciostomes, probably indicating several ovicells, just as a colony of *Diastopora* may have a number of ovicells. Smitt mentions eight oœciostomes in *L. verrucaria*, and this must have been a fine specimen, as I have never seen more than six. The zoœcial apertures in all recent species measured are about the same size (from about 0·06–0·09 mm.).

Defrancia lucernaria Sars and *Domopora stellata* have the ovicells in between the rays.

Frondipora has the ovicell across the anterior surface of a branch, not much raised, and the oœciostome, about 0·12 mm. wide with the lower edge straight, also is but little raised, and is not attached to a group of zoœcia.

Flosculipora has the ovicell-wall uniting from neighbouring zoœcial bundles.

* Calvet, "Bry. Cyclost. prov. des Camp. scient. accomp. p. S. A. S. le Prince de Monaco à bord de la Princesse-Alice," Bull. Inst. Ocean. No. 215, p. 7, fig. 5 (1911).

† Krit. Fort. 1866, p. 414.

‡ Expéd. Antarct. Belge, p. 89, pl. ix. fig. 6 (1904).

Heteropora. The ovicell is unknown in recent species, but Novak * figures one in a Cretaceous fossil. It is sac-like with a small opening at one end. Tentacles 14 in *H. pelliculata* Waters.

Supercytis has the ovicell at the end of the erect colony spreading over the whole width. The *Supercytis tubigera* Busk, of the 'Challenger,' is not related to *Supercytis*, nor is it correctly described, as the series are not uniserial but biserial. It looks more like a *Tubulipora*.

Crisulipora. Œciostome tube narrower than the zoœcial tube, without any terminal expansion, There are 10 tentacles.

Crisia denticulata (Lamarck). (Pl. IV. fig. 5.)

Crisia denticulata Waters, "Rep. Mar. Biol. of the Sudanese Red Sea, Bry. pt. ii. Cyclost. etc.," Journ. Linn. Soc., Zool. vol. xxxi. p. 232, pl. xxiv. figs. 1–3, pl. xxv. fig. 11 (1910); and add:—

Osburn, "Bry. of the Woods Hole Region," Bull. Bur. of Fisheries, vol. xxx. p. 216, pl. xviii. fig. 8 (1912); "Bry. from Labrador, etc.," Proc. Un. St. Nat. Mus. vol. xliii. p. 276 (1912); Guerin-Ganivet, "Bry. de la Région de Concarneau, etc.," Trav. Sc. du Lab. de Zool. et de Phys. Mar. de Concarneau, vol. iv. p. 19 (1912); "Mission Arctiques: Bryozoaires," Soc. d'Océan. du Golfe de Gascoigne, p. 39 (1913); Osburn, "Bry. of the Tortugas Islands, Florida," Pub. 182, Carnegie Inst. of Washington, p. 185 (1914).

We see that the connections from the stolons to the zoœcia, or through the septa of the stolon, in *Zoobotryon pellucidum* Ehr. (p. 849) and other Ctenostomata are much more elaborate than any description had indicated, a number of cells on each side meeting those on the other, and to these groups of cells reach the plasma network, which spreads through the stolon and the zoœcia. However, in *Crisia* and other Cyclostomata, I have not found a plasma network spreading all through the zoœcium, as we know it in Cheilostomata and Ctenostomata, but near the base below the cæcum there is a small number of threads. The polypide so nearly fills up the zoœcial tube, that there does not seem to be room for much network of plasma.

In *Crisia* and other Cyclostomata, the number of connecting pores is very considerable, being situated generally all along the surfaces, and, as a rule, the zoœcium at its proximal end is connected with the zoœcia on the two sides, in such a way that it seems impossible to speak of a new zoœcium having arisen from any one older zoœcium (Pl. IV. fig. 6). There are but few cells in contact with the pore, in this case apparently two on each side (Pl. IV. fig. 5).

Loc. Add: Arctic: Atlantic, Cape Verde Islands. Wasin, Brit. E. Africa, 10 fath. (501, 516).

* "Bry. der böhmischen Kreideformation," Denks. der Math.-Naturw. Cl. K. Akad. Wien, vol. xxxvii. pl. viii. figs. 30, 31 (1877).

Crisia elongata Milne-Edwards. (Pl. I. figs. 3, 4; Pl. IV. fig. 6.)

Crisia elongata Milne-Edwards, "Mém. sur les Crisies, les Hornères," Ann. des Sciences Nat. ser. 2, vol. ix. p. 10, pl. vii. fig. 2 (1838); ? Busk, Brit. Mus. Cat. Cyclost. p. 5, pl. iv. figs. 5, 6 (1875); ? Busk, Chall. Exp. Zool. vol. xvii. p. 5, pl. i. fig. 3 (1886).

The specimens from Wasin are without any doubt the species described by Milne-Edwards, even though he says "plus grèle" than *C. denticulata* Lamk., which is not the case. Busk, in his Museum Catalogue, speaks of the zoœcia being much produced, whereas this is never the case in my specimens, nor does Milne-Edwards show it, or even Busk himself in his figures.

The lateral branch, of which there is one, and only one, to each joint starts from near the end of a joint, after about the 6th–10th zoœcia on the one side. The last zoœcial tube is continued free, as is the case to a certain extent with the last zoœcium on the other side. The number of zoœcia is uneven, and in some of the terminal nodes as many as 13 pairs of zoœcia have been counted. There is the small mark below the oral aperture, as in *C. denticulata*, showing its relationship. The older chitinous joints are black, the younger ones are light. No ovicells are known.

The surface has numerous pores, and I do not understand Busk speaking of it as granular. The closure is slightly raised in the centre, and near this there are one or two pores.

The zoarium is about 0·3 mm. wide; the distance from zoœcium to zoœcium, on the same side, is about 0·25 mm., and the aperture of the zoœcia is about 0·07 mm.

Since I wrote my Naples paper, I have been able to examine better specimens of what I took to be *C. elongata*, which correspond most nearly with *C. cribraria* Stimpson, as re-described by Osburn *.

In the Naples specimens, the fresh internode arises after the 2nd, 3rd, or 4th zoœcium of the one side, and another branch arises from after about the 6th zoœcium on the other side; no ovicells were found, though some are forming at the very end of the branch, and the zoœcia are about 0·45 mm. apart, which is about the same as in *C. ramosa* H., with which it is allied, but the chitinous joints are light. What I called var. *angustata*, I now consider is *C. ramosa* Harm.

The Algoa Bay specimen, so described in the British Museum Catalogue, is probably *elongata*, and in this specimen the fresh branches are always high in the internode. The 'Challenger' specimen named *elongata* I do not think is this species, and it has branches both high and low in the internodes, more as in *C. ramosa*. The specimens called *elongata* by Norman from Madeira are more like *C. ramosa*.

Loc. Red Sea? (*M.-Ed.*); Algoa Bay? Wasin, Brit. E. Africa, 10 fath. (501), collected by Crossland.

* "Bryozoa of the Woods Hole Region," Bull. Bur. of Fisheries, vol. xxx. p. 215, pl. xviii. fig. 7 (1910).

Crisia sertularoides (Audouin & Savigny) *. (Pl. I. figs. 5, 6.)

Proboscina sertularoides Aud., "Descrip. de l'Égypte," Hist. nat. p. 236; Savigny, pl. vi. fig. 6.

Crisia recurva Heller, "Bry. des Adriat. Meeres," Verh. d. K.-K. zool.-bot. Gesellsch. Wien, vol. xvii. p. 118, pl. vi. figs. 3, 4 (1867).

Zoaria of rather straggling growth, apparently about 20 mm. high; internodes short, with 7–15 zoœcia, though usually 7–9, with light joints, and the branches grow from above the first zoœcium on that side, with sometimes another branch on the other side, near the distal end of the node. Branches not very wide (about 0·15 mm.); zoœcia directed forwards with only a short part free, the distance from zoœcium to zoœcium is about 0·21 mm., the zoœcial aperture is 0·06 mm.

The ovicells are very wide and large, irregular globular, placed to one side, and the œciostome is funnel-shaped.

The growth is like that of *C. eburnea* L., but the branches arise higher up after the first or second zoœcium, and in nodes where there is a branch the number of zoœcia is uneven. It is also much like *C. acropora* Busk, though the denticle by the aperture occurs but very rarely; from *C. ramosa* Harm., it differs in having shorter internodes and in having the zoœcia much nearer together. Although Heller's figures and description are unsatisfactory, it does not seem that there can be any doubt as to the identity of the species.

A specimen from Ras Osowamembe (504) has the zoœcia less spread out, the joints black in the older parts, and toe zoœcia about 0·28 mm. apart; the ovicells are large and irregular over the whole width of the zoarium. The difference may only be local, and it seems advisable to consider it a variety.

Loc. Adriatic (*Heller*). Wasin, Brit. E. Africa, 10 fath. (500); Chuaka, Zanzibar, 3 fath. (506), collected by Crossland.

Crisia inflata, sp. n. (Pl. I. figs. 1, 2.)

This is one of the most delicate species of *Crisia*, and is somewhat like *C. geniculata* M.-Ed., but there are two alternate zoœcia in a joint, the new node rising from the end of the last. The nodes of *C. geniculata* are twice to three times as long, and the zoœcial apertures of *geniculata* are about 0·075 mm., whereas in *inflata* they are only about 0·04–0·05 mm. The very light corneous tubes of the joint are, when examined with a high power, found to be marked with fine longitudinal lines.

The ovicell is suberect and is only an inflation of the zoœcial tube, being the simplest ovicell known. From this character the specific name is chosen. The œciostome is dorsal, so that it cannot be seen from the front, and is a small plain tube curved over, with a circular aperture 0·02–0·03 mm. The ovicell is not

* [The parentheses around the names of authors placed after scientific names in this paper are used in accordance with Article 23 of the International Rules of Nomenclature (Proc. 7th Int. Cong., Boston 1907, p. 44 (1912)).—Editor.]

elongate like the ovicell of *geniculata*, as figured by Busk and Harmer, and also as a specimen in my collection. Harmer considers that *C. geniculata* and *C. cornuta* must be separated, chiefly on account of differences in the ovicell, and although the present species is also allied there seem to be sufficient reasons for its separation. The *C. crisidiodes* Ort. has 2–3 zoœcia to each internode, with three-jointed setæ.

Loc. Wasin, Brit. E. Africa, 13 fath. (500), only one colony.

Crisia circinata, sp. n. (Pl. I. figs. 7–9.)

The zoarium divides into two main branches, and on each of these the fresh branches are mostly given off from the one side, and in the lower part of the zoarium the fresh branch arises at about the second zoœcium, while in the younger part the branches start from about the fourth. The joints are light. The distance from zoœcium to zoœcium is about 0·27 mm., and the round zoœcial aperture is about 0·08 mm. There are fewer pores on the zoœcia than in most *Crisiæ*, and the zoœcia extend free for a considerable distance.

The ovicells, occurring just after a bifurcation, are large and erect, with the curved oœciostome on the distal or dorsal surface of the ovicell, with the oœciopore only 0·05 mm. diameter.

The ovicell of *Crisia* may appear to be central as in *C. ramosa* Harm., *C. fistulosa* Hell., etc., and is then long and pear-shaped, or it may appear to be at one side, and may be shorter, when we call it pomiform. There are others in which the ovicell is free, not being attached by its surface, and with the oœciostome on its dorsal surface instead of being directed forwards. Free ovicells occur in *C. edwardsiana* d'Orb., *C. biciliata* MacG., *C. howensis* Maplestone.

I have felt much hesitation as to whether the form described is the *Crisia cuneata* Maplestone *, and it also has many points of resemblance with *C. cylindrica* Busk, but a different ovicell is figured. The Museum specimens (528, 853) of *cylindrica* have no ovicells.

Loc. Ras Osowamembe, Zanzibar Channel, 10 fath., only one specimen (504); Prison Island, Zanzibar Channel, 8 fath. (505); Brit. E. Africa, 10 fath. (520): collected by Crossland.

Entalophora wasinensis, nom. nov. (Pl. II. figs. 1–4, 9: Text-fig. 1.)

Entalophora deflexa Smitt, "Floridan Bryozoa," pt. i. p. 11, pl. v. figs. 28–30 (1872).

As this does not seem to be the same as the small delicate British species known as *deflexa* Couch, I have given it another name.

The specimens from Zanzibar are buried in sponge, which has

* "Lord Howe Island Polyzoa," Proc. Roy. Soc. Vict. vol. xvii. n. s., p. 390, pl. xxix. fig. 12 (1904).

grown over them. The zoarium is about 25 mm. high, dividing into many new branches at rather an acute angle. There are many zoœcia, with long tubes all round the zoarium, with the oral aperture 0·09 mm.–0·1 mm. There are 12 tentacles, and transverse sections show about 15–16 zoœcia.

The base of this species has not been seen, but *E. proboscidea* grows from a multiserial *Stomatopora*-like base, which often spreads for some distance before the erect growth commences.

E. deflexa also starts from a *Stomatopora* base which is

Text-figure 1.

Entalophora wasinensis. × about 4.

principally uniserial, though in places it may be biserial. The zoœcia of this species, *E. elegans* Norm., and *E. deflexa* Couch, have the aperture about the same size and are allied; and as the zoarial growth of *E. elegans* Norman * is similar, it is doubtful

* "Polyzoa of Madeira," Journ. Linn. Soc., Zool. vol. xxx. p. 281, pl. xxxv. figs. 4, 5 (1909).

whether the greater projection of the zoœcial tubes may not depend on local conditions.

Only few ovicells have been found: one is small at the side just above a bifurcation, and has an oœciostome with a narrow opening and a somewhat triangular plate in front of it. The other ovicells have the oœciostomes like those in the first, and spread round several zoœcia without including any—that is, none pass through it. This structure was shown by Smitt (fig. 30).

Very few ovicells of recent *Entalophora* have been described. Busk says of *E. delicatula* B. "oœcium tumid," but it has never been figured. In the 'Challenger' Report Busk, on pl. iv. fig. 1*b*, figures an irregular zoœcium as an "ovicell dilation," but from an examination of the specimen I think this is a mistake, as there is no sign of more numerous perforations, which we seem always to find on the ovicells of these groups of Cyclostomata.

In my collection there are ovicells on *E. regularis* MacG. and *E. intricaria* Busk*, but these and some other species, among which what I considered was *E. rugosa* d'Orb., from Naples, will probably have to be removed from *Entalophora*, as sections show a distinct lamina, and the ovicells are wide with the zoœcial tubes passing through, reminding us of the ovicells of *Diastopora*, with which they are closely allied, but whether they must be called *Diastopora* or *Bidiastopora* need not now be considered. Among fossils also, no doubt many must be removed from *Entalophora* to Diastoporidæ. D'Orbigny and others have also placed under *Entalophora* many species now removed to *Meliceritites*.

The ovicells of fossil *Entalophora* (*Spiropora*) *annulosa* Mich. are figured by Canu†, and are fairly similar to the ovicells of the present species. Canu does not figure the zoœcia spiral or regular, therefore why does he call it *Spiropora*?

Loc. Florida (*Smitt*). Wasin, Brit. E. Africa, 10 fath. (501) (507); Ras Osowamembe, Zanzibar Channel, 10 fath. (504): collected by Crossland.

Filisparsa tubulosa (Busk).

Hornera violacea var. *tubulosa* Busk, Cat. Mar. Poly. pt. iii. p. 19, pl. xviii. fig. 4: for synonyms see Waters, "Austral. Bry.", Ann. Mag. Nat. Hist. ser. 5, vol. xx. p. 257 (1887); and "Rep. Mar. Biol. of Sudanese Red Sea, Bryozoa," Journ. Linn. Soc., Zool. vol. xxxi. p. 235, pl. xxv. figs. 16, 17 (1910); and add: Seguenza, Form. Terz. pp. 297, 372 (1879); De Stefani, "Jejo Montalto e

* *E. intricaria* Busk has the rays or spines on the outside of the zoœcial tubes, which pass through the ovicells. The lamina is not seen in all stages, and in the section which I figured, Q. Journ. Geol. Soc. vol. xliii., pl. xviii. fig. 5, none is seen, though in other pieces it is quite distinct.

† "Études sur les ovicells des Bryoz. du Bathonien d'Occaignes," Bull. de la Soc. Géol. de France, 3me sér. vol. xxvi. p. 282, figs. 19, 20 (1898).

Capo Vat.", Mem. R. Accad. d. Lincei, vol. xviii. p. 208 (1882), Neviani, "Bri. Neog. delle Calabrie," Pal. Ital. vol. vi. p. 234 (1900).

As Busk made a mistake about numbering his figures, it is difficult to understand what he meant, but in spite of this it seems advisable to retain his name. Apparently the type *violacea* also should be *Filisparsa*, and in the Norman collection specimens so named, from Florö, have none of the appearance of *Hornera*, but look like *Filisparsa*, having anterior ovicells which are broken down. There is among these specimens one piece of *Hornera*, perhaps *lichenoides*, evidently misplaced.

The specimens from Wasin have the oral aperture about 0·15 mm., corresponding in this respect with specimens from Naples and Australia, and here also the closure of the zoœcial tube has a number of perforations similar in appearance to those of the zoœcia. There are 14 tentacles. The ovicell spreads over the front, and the oœciostome, directed somewhat backwards, is about the width of the zoœcial aperture, but in the longitudinal axis is only about 0·07 mm. There can scarcely be said to be a funnel, although there is an irregular expansion which frequently curves over.

The expansion and funnels of the oœciostomes of the Cyclostomata are often very variable, so that too much weight must not be attached to their measurements; also some ovicells may be found with and others without funnels.

There are some specimens from Zanzibar, apparently of this species, which in younger parts just touch the support at intervals, though there are no definite rows of dorsal projections as in *Tubulipora pulchra* MacG.; in the older parts there are strong calcareous radicles, sometimes formed of only one tube, but more frequently of two or three, which may divide at the end to form claspers. *Idmonea pedata* Norman has still larger radicles the width of the zoarium, often formed by five or six tubes.

A species from Naples, which I have considered to be the *Tubulipora incrassata* d'Orb. as more fully described and figured by Smitt, has zoœcia much about the same size, and standing up in the same way; but the zoarium spreads out fan-shaped, instead of being unattached for a considerable distance, and is continuous about the same width. The ovicell is situated as in *T. tubulosa*, with the oœciostome about the same size as the zoœcial tubes, sometimes ending off straight, at other times with a funnel.

Loc. Naples (*W.*); Victoria (*MacG.*); Holborn Island, Queensland, 20 fath.; North Atlantic (*B.*). Ras Osowamembe, Zanzibar Channel, 10 fath. (504), collected by Crossland.

Fossil. Tertiary: Rhodes, Sicily, etc.

Tervia irregularis (Meneghini). (Pl. IV. fig. 8.)

Idmonea irregularis Meneghini, "Polipi della fam. dei Tubul. finora osserv. nell' Adriatico," Nuovi Saggi del Accad. di Scienze,

Padova, vol. vi. p. 12 (1844). For synonyms see Miss Jelly's Catalogue and add :—

Filisparsa irregularis Waters, "Ovicells of Cyclost. Bry.," Journ. Linn. Soc., Zool. vol. xx. p. 279, pl. xiv. figs. 5, 6 (1888); Norman, "Poly. of Madeira," Journ. Linn. Soc., Zool. vol. xxx. p. 279, pl. xxxiv. figs. 1–3 (1909).

Tervia folini Calvet, "Rech. de la Camp. du 'Caudan,'" Ann. de l'Univ. de Lyon, p. 265, pl. vii. figs. 1–3 (1896).

Tervia irregularis, Jull. & Calv. "Bry. de l'Hirondelle," p. 114, & p. 157, pl. xiv. fig. 7 (1903).

The proximal part of the zoarium has the zoœcia irregularly placed as in *Filisparsa*; then later, usually after the first branching, there are distinct series on each side, often with isolated zoœcia in the median line. The very earliest part, namely the primary, is like that of *Stomatopora*, being about the same size as ordinary zoœcia and but very slightly expanded at the proximal end, whereas in *Tubulipora* and many other Cyclostomata there is a large disk. This disk I have figured in *Tubulipora pulchra*, and it has also been figured by Barrois, Robertson and others.

Inside the zoœcial tube, about the position where it becomes erect, there is on the proximal side a shallow comb-like process (Pl. IV. fig. 8). This is where the closure takes place. There are combs in some Membraniporidæ, and spinous processes in many Cyclostomata, but I have not found a similar comb in any other Cyclostomata and it does not occur in *Filisparsa tubulosa*.

Loc. Adriatic; Naples, 40 fath.; Genoa: Bay of Biscay: Azores, 450 fath. (*J. & C.*); Madeira (*M.*); off Cape Blanco, West Africa, 235 met. (*J. & C.*); Australia. Wasin, Brit. E. Africa, 10 fath. (507), collected by Crossland.

Idmonea milneana d'Orbigny.

For synonyms and localities, see Waters, "Bry. from near Cape Horn," Journ. Linn. Soc., Zool. vol. xxix. p. 249 (1904).

From Ras Osowamembe, Zanzibar Channel, 10 fath. (504), collected by Crossland.

Idmonea radians (Lamarck). (Pl. II. figs. 6, 7, 8, 10.)

For synonyms see Miss Jelly's Catalogue and add :—

Dollman, W. P., Journ. Roy. Micr. Soc. pl. viii. 1906, photograph only; Philipps, E. G., "Polyzoa collected by Dr. Willey," Willey's Zool. Results, pt. iv. p. 449 (1899); MacGillivray, "Monog. of the Tert. Polyzoa of Victoria," Trans. Roy. Soc. Vict. vol. iv. p. 121, pl. xvi. fig. 18 (1895).

Besides the more usual form with short branches (fig. 8*a*) there are from both localities specimens with long ones (fig. 8) having similar subparallel branches. MacGillivray has referred to a larger form, and Busk called it var. *erecta*. In the smaller

form as a rule there are two zoœcia to a series, though there may be three, especially near the growing ends, while the larger form has three zoœcia or occasionally four. A range of intermediate sizes have been met with.

The ovicells are anterior, near a bifurcation, or in other positions, even often half-way between two bifurcations; large pores or pits occur on the surface. The oœciostome is on one side, most frequently by the first zoœcium of the second series involved (fig. 6), though sometimes it occurs by the third series, but never more than one oœciostome has been seen on an ovicell, and the tubular oœciostome turns over and downwards, resembling in position and form the oœciostomes of *I. atlantica* F., *I. concava* Rss., and *I. parasitica* Busk.

The large lateral plates on the ovicell described by me* as occurring in Torres Straits and Australian specimens, are not seen in those from Zanzibar, though from the localities previously mentioned they are very distinct, and are also seen in the 'Challenger' specimens from Tongatabu, and in the British Museum specimens from Cape Capricorn, where however they are elongate rather than round. There are no frontal ridges on the ovicell as described by MacGillivray. The series are about 0·26 mm. apart, which is much closer together than in any other species measured. *I. atlantica* F. is 0·6–1 mm.; *I. australis* MacG. 0·75 mm.; *I. concava* Reuss 0·5 mm.; *I. pedata* Norm. 0·45 mm.; *I. tumida* Sm. 0·7 mm. The zoœcial aperture is about 0·06 mm., whereas in *I. atlantica* it is 0·15 mm.; in *I. milneana* 0·16–0·2 mm. There are 8 tentacles.

The ovicell consists of several lobes, there being on both sides one between each two series of zoœcia, so that in a mature ovicell there are usually six such lobes. The embryos are small; the mature ones may be 0·1 mm. across or even a trifle larger, but the majority are smaller. There is not much difference from the embryos of *Entalophora wasinensis* nov., though a little larger, but they are smaller than those of *Diastopora intricaria* Sm., 0·12 mm.

Ostroumoff† says the larvæ of the Cyclostomata vary in size downwards from *Hornera* which is 0·48 mm., through *Tubulipora*, *Frondipora*, *Lichenopora*, to *Crisia*, which last is only 0·07 mm. In sections I have found *Hornera lichenoides* 0·4 mm. and various species of *Crisia* from 0·07–0·1. The range in the Cheilostomata is somewhat similar, as *Diplodymoides* is 0·08, and *Systenopora* 0·37 mm.

This is no doubt *Crisina hochstetteriana* Stoliczka‡, but the

* "Bry. from New South Wales" etc., Ann. Mag. Nat. Hist., ser. 5, vol. xx. p. 255, pl. vi. figs. 27, 28 (1887).

† "Zur Entwickelungsgeschichte der Cyclost. Seebryozoen," Mitt. Zool. Stat. zu Neapel, vol. vii. p. 180 (1887).

‡ "Foss. Bry. der Orakei Bay bei Aucklaud," Novara Expedition, p. 113, pl. xviii. fig. 3 (1864).

I. hochstetteriana of MacGillivray * is clearly *Hornera* † *fissurata*, Busk.

The name *Idmonea* ‡ is used in the sense it has been used for a long time, although recognising that in some cases it is difficult to find distinctions between *Idmonea* and *Tubulipora*, and that it is possible they may have to be merged.

But *Tubulipora* spreads out continuously, whereas *Idmonea* continues of the same width; also *Tubulipora* has a more or less central ovicell with a central œciostome, while *Idmonea* usually has the œciostome near to the series at one side. Perhaps further study of the primaries and early growth, as well as the ovicells, may establish the position, but for the present no harm is done by waiting until the whole of the group is better understood.

Loc. New Zealand, Wanganui, etc.; Tongatabu, 18 fath.; Honolulu, 20–40 fath.; Victoria; Port Jackson (*H.*), Adelaide (*A. W.*), Sydney; Port Stephens, 5–6 fath.; Green Point, 8 fath.; Darnley Island, Torres Straits, 10–30 fath.; Cape Capricorn, B.M. coll.; Lifu (*Ph.*); Port Elizabeth (in Miss Jelly's collection). Both the small and the var. *erecta* forms from Ras Osowamembe, Zanzibar Channel, 10 fath. (504), and Prison Island, Zanzibar Channel, 8 fath. (505), collected by Crossland.

Fossil. Orakei Bay, N. Z.; Mount Gambier, S. Aust.; Bairnsdale, Gippsland.

IDMONEA INTERJUNCTA MacGillivray. (Pl. II. fig. 5.)

Idmonea interjuncta MacG. Trans. Roy. Soc. Vict. vol. xxii. p. 137, 10 (sep.) (1886); Waters, "Austral. Bry.," Ann. Mag. Nat. Hist. ser. 5, vol. xx. p. 256, pl. vi. fig. 29 (1887).

Idmonea pedleyi Haswell, "Cyclos. Polyzoa of Port Jackson," Proc. Linn Soc. N. S. Wales, vol. iv. p. 351 (1880).

Idmonea pulcherrima Kirkpatrick, "Hyd. and Poly. from the China Sea," Ann. Mag. Nat. Hist. ser. 6, vol. v. p. 22, pl. iv. fig. 6 (1890).

The zoœcial aperture is about 0·12 mm., and the œciostome is the same size.

Some specimens from Ras Osowamembe have faint ridges on the dorsal surface, and by the side of these ridges are rows of pores, transverse to the zoarium. Lines of pores, though not as marked, are also found on *Idmonea milneana* d'Orb., a species in many respects similar, but *milneana* is a larger species having the zoœcial aperture larger.

Loc. Port Phillip Heads (*MacG.*); Green Point, Port Jackson, 8 fath. (*Waters*). Ras Osowamembe, Zanzibar Channel, 10 fath.

* "Tert. Polyzoa of Victoria," Trans. Roy. Soc. Vict. vol. iv. p. 120, pl. xvi. figs. 12–16 (1895).

† See my re-description "On some Ovicells of Cycl. Bry.", Journ. Linn. Soc., Zool. vol. xx. p. 275, pl. xiv. figs. 1, 3, 4, 7 (1888).

‡ See Harmer, "Devel. of Tubulipora," Quart. Journ. Micr. Sc. vol. xli. n. s. p. 88 (1898).

(504); Prison Island, Zanzibar Channel, 8 fath. (505), collected by Crossland.

AMATHIA LENDIGERA (Linnæus). (Pl. IV. figs. 3, 4.)

For synonyms see Miss Jelly's Catalogue and add:—

Amathia lendigera (L.), MacGillivray, "On the Australian Species of *Amathia*," Proc. Roy. Soc. Vict. vol. vii. p. 135, pl. B. fig. 1 (1894); Calvet, "Bry. Ectoproctes," pl. viii. figs. 19, 20, pl. xiii. figs. 13, 21 (1900); "Bry. Mar. des Côtes de Corse," p. 46 (1902); "Bry. Mar. de la Région de Cette," p. 90 (1902); Jullien & Calvet, "Bry. de l'Hirondelle," p. 31 (1903); Guerin-Ganivet, "Bry. de la Rég. de Concarneau," Tr. Sc. du Lab. de Zool. et de Phys. Mar. de Concarneau, vol. iv. p. 23 (1912).

The stems of the specimens from Chuaka are about 0·07 mm. in diameter. This species differs from *A. vidovci* Heller in not having the zoœcia spiral, also in the branching being more or less at right angles to the main branch (fig. 4), whereas in most *Amathia* the branches divide equally in both directions. Hincks has figured the branching of *lendigera*.

Some sections of material from Swanage cut across the rosette-plate show the semicircle of cells, with nuclei at the end of the cell, directed to the pore; also the round mesenchym-cells with round nuclei are separated from the wall of the stolon, and are seen to pass over the mound of cells; up to this mound come the funicular threads with their elongate nuclei (fig. 3). The structure of the cells near the rosette is very similar to that described in *Zoobotryon* (see page 850).

Loc. British, French and Belgian coasts, Mediterranean, Adriatic; Corsica (40-60 met.) (*Calvet*); Azores (*J. & C.*); Western Port, Victoria (*MacG.*). Chuaka, Zanzibar shore (521, 523), collected by Crossland.

AMATHIA SEMICONVOLUTA (Lamouroux).

Amathia semiconvoluta Lamx. Encycl. Méth., Zoophytes, p. 44 (1824); Heller, "Bry. Adriat.," Verh. der K.K. zool.-bot. Ges. Wien, vol. xvii. p. 127, pl. v. figs. 1, 2 (1867); Calvet, Bry. Ectoproctes, pl. vii. figs. 8, 9, pl. viii. figs. 16. 18 (1900); "Bry. Mar. de la Région de Cette," Tr. Inst. de Zool. de l'Univ. de Montpellier, ser. 2, mém. 11, p. 89 (1902); Waters, Journ. Linn. Soc., Zool. vol. xxxi. pl. xxiv. fig. 6 (1910).

Serialaria semiconvoluta Lamk. Hist. Nat. d'Anim. sans vert., ed. ii. vol. ii. p. 171 (1836); d'Orbigny, Pal. Franç. vol. v. p. 595 (1850-52).

The yellowish thick chitin-stem is about 0·25 mm. diameter. Near the proximal end of each internode there is a clear oval spot, which is for the attachment of a radicle, yet although this mark for the attachment occurs in all internodes, radicles have only been seen in a very few cases. A similar mark for radicles occurs in *A. obliqua* MacG., and also in *A. brasiliensis* Busk, of

the 'Challenger,' which no doubt is really *A. semiconvoluta*, but the character has not been found in any other species examined.

Loc. Mediterranean; Naples (*A. W. W. coll.*); Adriatic (*Heller*). Wasin, Brit. E. Africa, 10 fath. (501), collected by Crossland.

Amathia distans Busk.

Amathia distans Busk, Chall. Exp., Zool. vol. xvii. pt. 50. p. 33, pl. vii. fig. 1 (1886): MacGillivray, "On some S. Australian Polyzoa," Trans. Roy. Soc. S. Australia, vol. xii. p. 30 (1889); "On the Austral. Sp. of *Amathia*," Proc. Roy. Soc. Victoria, vol. vii. p. 134, pl. C. fig. 3 (1894); Waters, "Mar. Biol. of the Sudanese Red Sea, Bryozoa," Journ. Linn. Soc., Zool. vol. xxxi. p. 243, pl. xxiv. fig. 7 (1910).

The *A. distans* B., *A. tortuosa* B., *A. semiconvoluta* Lamx., and *A. vidovici* Hell. form an incomplete spiral round the stem, only occupying part of the internode. The stem of *A. distans* is thin, measuring 0·07 mm. diameter in most of the present specimens. The 'Challenger' specimens which I measured have the diameter about 0·1 mm. I seem to have measured some abnormal piece from Zanzibar which was stouter. From bifurcation to bifurcation is about 2 mm. long. There are 8 tentacles.

Loc. Off Bahia, 10–20 fath. (*B.*); South Australia (*MacG.*); New South Wales (*A. W. W. coll.*). Zanzibar town, shore, marked "pink Polyzoum" (527), collected by Crossland.

Amathia vidovici (Heller). (Pl. IV. figs. 1, 2.)

Valkeria vidovici Heller, "Die Bry. des Adriat. Meeres," Verh. der K.K. zool.-bot. Ges. Wien, vol. xvii. p. 128, pl. v. figs. 3, 4 (1867).

Vesicularia dichotoma Verrill, "Invert. animals of Vineyard Sound," Rep. Comm. of Fish and Fisheries for 1871–2, p. 874.

Amathia lendigera Busk, Chall. Exp., Zool. vol. xvii. p. 33 (1886).

Amathia dichotoma Osburn (Verrill), "Bry. of the Woods Hole Region," Bull. Bur. of Fish. vol. xxx. p. 254, pl. xxix. figs. 81, 81 *a* (1912).

The zoœcia at a bifurcation are in short biserial clusters, spirally arranged, encircling the stolon. There is sometimes a small cluster between a bifurcation as shown by Heller, whose figure was evidently from a dried specimen and is not entirely satisfactory.

The branches are about 0·2 mm. in diameter. There are 8 tentacles, which is the same as in *A. lendigera* L., *A. semiconvoluta* Lamx., *A. brongniartii* Kirkp., and *A. distans* B. The gizzard is about 0·05–0·06 mm. diameter.

The connecting cells on the two sides of the rosette-plates are fairly similar to those of *Zoobotryon pellucidum* Ehr., radiating on both sides from the pore, and the cells near this pore stain more darkly than the others (fig. 2).

Loc. Adriatic (*Heller*); Genoa (*Waters coll.*); Roscoff, sent to

me by Jullien as *A. semiconvoluta*; Bermuda, 30 fath. (*Chall.*); Great Egg Harbour, N. J.; Long Island Sound (*Verrill*); Vineyard Haven, Edgartown, Woods Hole, Nantucket (*Osburn*). Wasin, Brit. E. Africa, 10 fath. (500) (501), collected by Crossland.

Zoobotryon pellucidum Ehrenberg. (Pl. III. figs. 4–12; Pl. IV. fig. 12.)

For synonyms see Waters, "Mar. Biol. of the Sudanese Red Sea, Bryozoa," Journ. Linn. Soc., Zool. vol. xxxi. p. 243, pl. iv. figs. 12, 15 (1910), and add:—Osburn, "Bry. of the Tortugas Islands, Florida," Pub. 182, Carnegie Inst. of Washington, p. 218 (1914).

The appearance of the specimens from Chuaka Bay, at first sight, suggest specific separation from *Z. pellucidum*, as on the whole length of the long internodes there are two distinct, wide series of zoœcia closely crowded, but with vacant longitudinal spaces between the series. In the Naples specimens the existence of series of zoœcia is obscured, as the zoœcia in many cases seem to be scattered over the stem and the whole length is not usually covered; but an examination of the stolon of these Naples specimens after the zoœcia have been removed, shows two groups of about four longitudinal rows of rosette-plates, so that the differences between the Naples and Zanzibar specimens are but slight, although the conditions of luxuriance are very different. Hincks's name of *biserialis* and MacGillivray's *bilateralis* would have been very suitable for this form. There are frequently more than three branches at the end of the internode, sometimes as many as six.

The zoœcia are about 0·3 mm. long, and in the sections made the ova are usually single, or in some cases there are two in an ovarium.

The embryo is surrounded by an ovicell sac, much the same as in *Adeonellæ* * and in *Diplodidymia* *, the growth of the embryo and of the sac going on simultaneously, and in many cases they are so close together that at first it is difficult to distinguish the sac from the embryo. In these cases the ovum must pass to the distal end under the operculum, from where it is developed.

On the other hand, in most of the Cheilostomata and in the Cyclostomata, the ovicell is formed before the embryo is ready for it. In the Cyclostomata the walls may be seen starting at various points † to ultimately unite to form the ovicell.

The rosette-plates were first described by Reichert ‡ in this species, and it does not seem that anyone, except Smitt, had previously described anything of the kind, but what Smitt figured

* Waters, "Bry. from Zanzibar," Proc. Zool. Soc. 1913, p. 529, pl. lxxiii. figs. 3 & 5, and p. 490, text-fig. 79.

† "On the Ovicells of some Lichenoporæ," Journ. Linn. Soc., Zool. vol. xx. pl. xv. fig. 6 (1888); "Mar. Biol. Sud. Red Sea, Bry.." Journ. Linn. Soc., Zool. vol. xxxi. pl. xxv. fig. 16 (1909).

‡ "Vergl. Anat. Untersuch. ü. *Zoobotryon pellucidus*, Ehr.," Abhand. k. Akad. der Wiss. Berlin, p. 276 (1869).

as a communication pore was evidently the entire plate, it not being realised that there were not large pores, but only minute perforations. Reichert described and figured the plate as with a central perforation with 8–10 pores round it * (pl. iii. fig. 7), but this is not the case, as there is only one † perforation, and what Reichert took to be pores surrounding a central pore are really a circle of cells, on the older side of the rosette-plate, with a relatively large round nucleus and a thin prolongation. The disk is thinner than the surrounding walls, as figured by Reichert (*loc. cit.* pl. iii. fig. 7). Sections and preparations of *Zoobotryon* from Naples, the Soudan and Wasin, enable me to add slightly to our knowledge of this species.

By the rosette-plates of the zoœcia the cells just mentioned often stain very darkly, so that no structure can be seen, but in other cases the plate is seen with all these cells in a semicircle ‡ (Pl. III. figs. 7, 8, 9, 12) pointing their thinner edge to the centre, or with them even raised to the one minute opening. Above, that is on the younger side of the rosette-plate, there are a number of cells, probably usually the same number as below, and these also have long thread-like projections which pass to the opening to touch the projections of the under circle of cells, that is as if eight fingers from below were raised to touch eight fingers from above. From both sets of cells spread other cells in a more or less radiating manner, and to these mounds of cells the funicular or plasma-threads reach, distinguishable from the others by their elongated nuclei. These plasma-cords spread to all the organs of the zoarium.

The layer of mesenchym-cells lining the zoœcial walls (Pl. III. fig. 10; Pl. IV. figs. 2, 3) spread to this mound of cells, and can be distinguished by the round cells and round nuclei from the funicular threads with their long cells and elongate nuclei. There is sometimes on one side a more or less semicircular cover over the circle of radiating cells, which it is difficult to understand, and they never occur in the early stages, and certainly they cannot be continuous all over or there would be no connection from the two sides.

An ovum is often seen pretty near to the rosette-plate, so that it must move up to the distal end to be enclosed in the ovisac. When there is an ovum, and usually in the older zoœcia, there is a considerable change in the funiculus near to the rosette-plate, as it has become granular (Pl. III. figs. 10, 11), so that from this appearance the condition of the zoœcium can be surmised.

Nitsche § spoke of the accumulation of cells over the rosette-plate as a "Pfropf" (plug or stopper), and Reichert mentioned

* This figure was copied by Hincks, Brit. Mar. Poly. p. ix, fig. 4.

† Joliet, Bry. des Côtes de France, p. 31, footnote, says that *Bowerbankia* has only one perforation. As I have previously stated, *Zoobotryon* and *Bowerbankia* should not be generically separated.

‡ This is the "jonciurie" of Jullien, who describes a similar arrangement of cells to the jonciurie of *Schizoporella malusii* Aud., 'Cap Horn,' p. 42.

§ "Beitr. z. Kennt. der Bryozoen," Zeit. f. wiss. Zool. vol. xxi. p. 9 (1871).

the thickening of the "Communale Bewegungsorgan" above and below the septa, whereas F. Müller had called it a ganglion, maintaining that there was a common nervous system through the colony; also Smitt*, in *Bugula*, called them colonial nervous ganglia. We have seen that to these mounds of cells the network of plasma threads reaches, and this is what has been called the colonial nervous system and the colonial organ of movement, and it was figured by Müller, Reichert, and Nitsche as a stout, solid or tubular body, but instead there are a number of anastomosing and reticulate threads, though with very low powers it may look like a band: neither alive nor in stained sections is any such solid or tubular band seen. Nitsche's figures must be looked upon as diagrammatic, and Reichert's, as I have previously stated, as though he had *Zoobotryon* in a pathological condition, and it is to be regretted that Hincks copied his figures. Vigelius, Freese, and others have correctly understood these plasma threads.

It is strange that no histological work has been done on *Zoobotryon*, as it is eminently suitable for elucidating many interesting and important points of cell-structure, etc.

The name rosette-plate was given supposing that there was a rosette of pores, whereas there is really a rosette of cells.

Loc. Add: Florida (*Osb.*); Chuaka Bay, Zanzibar, 2 fath. (509), collected by Crossland.

Bowerbankia pustulosa (Ellis & Solander).

Sertularia pustulosa Ellis & Solander, "Nat. Hist. of many curious and uncommon Zoophytes," p. 54 (1786).

Bowerbankia pustulosa Hincks, Brit. Mar. Poly. p. 522, pl. lxxvi. figs. 1, 5 (1880); Calvet, "Bry. Ectoproctes," pl. vi. fig. 13, pl. vii. figs. 4–8, pl. viii. fig. 21, pl. x. fig. 13, pl. xi. figs. 18, 19, pl. xii. figs. 15–17, pl. xiii. figs. 11, 14 (1900).

The descriptions and determinations of *Bowerbankia* are so uncertain that there seems little object in giving a full list of synonyms. This species has been mistaken † for *Valkeria uva* L. and *B. imbricata* Adams.

Loc. British; Mediterranean; Chuaka, Zanzibar Channel, shore (523), collected by Crossland.

Mimosella bigeminata, sp. n. (Pl. III. figs. 1–3.)

The zoarium consists of unbranched stems (about 0·3 mm. diameter) rising from a spreading stolon (about 0·15 mm.). The first internode of the stem is long (say about 1·65 mm.) followed by one about 0·4 mm., and then the remaining ones are shorter, say 0·35 mm. There may be as many as 50 internodes in a stem. In the lower internodes there is only a pair of opposite zoœcia close to the distal end, but after the second or third internode there is a second pair placed rather to the side and lower down but

* Hafs-Bry. Utveck. Öfv. Stockh. Akad. xxii. pl. vi. fig. 7 (1865).

† See Waters, "Mar. Biol. of the Sudanese Red Sea, Bryozoa," Journ. Linn. Soc., Zool. vol. xxxi. pp. 249, 250 (1910).

close to the other pair. There are several cases where there has apparently been an injury, and a new branch grows from the side of the broken one, and then, although the original stem has had the double pairs of zoœcia, yet the new growth may have more than two internodes with only a pair of zoœcia, but subsequently there are two pairs to each, though special causes may occasion irregularities. The diaphragm at the base of a zoœcium has one pore. Near the base of the zoœcium there are strong muscles for moving the zoœcium, and similar muscles occur in *M. gracilis* H., although Hincks said there were none. The new species differs from *M. gracilis* H. in the stems not branching, and in having four zoœcia grouped at the distal end of the internode.

Triticella armata Verrill has the zoarial growth very similar to that of *Mimosella*, but, according to Osburn *, it has a gizzard, and evidently does not belong to the present group.

The name *bigeminata* was suggested by Dr Harmer, who, when I told him that I had found and figured this *Mimosella*, thought that he had also found it in the 'Siboga' material. When he showed me his specimens, which are from better material than mine, the identity seemed to me quite clear, and, on seeing mine, Dr. Harmer agreed that this was the case, so that, with his permission, the name originally proposed has been changed.

Loc. Ras Osowamembe, Zanzibar Channel, 10 fath. (504), collected by Crossland.

There is a small fragment of another *Mimosella* from Chuaka, which I hesitate to name as it is incomplete. Just below the diaphragm of the main stem there is a lateral stem on each side, and each of these has two or three single zoœcia growing direct from the stem and directed distally, with this free unoccupied stem continuing beyond the zoœcia. On the lateral stem there is a diaphragm before and after each zoœcium. In one lateral stem there are two plates of attachment, as if there had been two pairs of zoœcia, though on all the others the zoœcia are uniserial. The zoœcia are about 0·25 mm.–0·3 mm. long. The stem is about 0·02 mm. diam. The growth of this species somewhat reminds us of *Farrella atlantica* B., which, however, has the zoœcia more or less stalked, whereas in this *Mimosella* the base of the zoœcium is rounded like that of *Bowerbankia*. In *Valkeria uva* L. there is a diaphragm above and below the group of zoœcia, whereas in *Mimosella gracilis* H., *F. atlantica*, and this species there is only the one diaphragm just beyond the branches.

Farrella atlantica Busk. (Pl. IV. fig. 9.)

Farrella atlantica Busk, 'Challenger' Exped., Zool. vol. xvii. p. 37, pl. vii. fig. 3 (1886); Thornely, "Rep. Pearl-Oyster Fisheries of the Gulf of Manaar," p. 128 (1905); "Mar. Poly. Ind. Ocean," Trans. Linn. Soc. vol. xv. p. 157 (1912).

* Osburn calls it *Hippuraria*, but I have shown that the genus was founded on a mistake, as the "stem" was a seaweed upon which it grew: see "Rep. Sudanese Bry.," Journ. Linn. Soc., Zool. vol. xxxi. p. 241.

Hippuraria verticillata Hincks (*non* Heller), Ann. Mag. Nat. Hist. ser. 5, vol. xix. p. 311, pl. ix. fig. 8 (1887).

I have only found a small piece from the Red Sea, but it is evidently widely distributed, as I have it from Naples, the Red Sea, and Zanzibar.

The rhizome of the Zanzibar specimens is 0·01 mm. in diameter; the zoœcia are 0·4 mm. long and 0·1 mm. wide, about the size given by Busk. At intervals on the stalk there is a pair of zoœcia growing from an expanded part, and there is often from the same expansions a pair of radicles growing at right angles to the stalk; also frequently there are lateral branches near to the expansions, and these sometimes have pairs of zoœcia near to the main branch.

A zoœcium from which a polypide has disappeared usually assumes a swollen * barrel-shape (Pl. IV. fig. 9, *b*), as the muscles which kept them in shape have now disappeared, and the same kind of thing occurs in many Ctenostomata.

I am unable to follow Hincks when he identifies his *Hippuraria verticillata* † with Heller's species; also I have shown that the genus *Hippuraria* was founded upon a mistake, and is only a synonym of *Triticella*. Although Hincks speaks of a group of cells at the joint, the figure shows a pair, and perhaps other nearly adjacent pairs have given the appearance of a group, so that, although I have scarcely any doubt as to Hincks's *verticillata* being a synonym of Busk's *atlantica*, there is just the possibility of this not being the case.

The peduncle is attached to the zoœcium excentrically, and there is a muscle from the side of the wall to the projecting base of the zoœcium by which it is moved as a whole.

There is a somewhat similar muscle in *Mimosella gracilis* Hincks. Joliet mentions this also in his *Valkeria nutans* ‡, and Hincks was apparently unaware of Joliet's later description when describing *H. verticillata*. Heller's figure of *Valkeria verticillata*, and Hincks's figure of *Valkeria uva* in the 'British Marine Polyzoa' are very similar.

Loc. Bahia, 10–20 fath. (*Chall.*); Naples (*A. W. W. coll.*); Adriatic; Suez; Ceylon (*Th.*); Indian Ocean (*Th.*); Amirante, 25 fath. (*Th.*); Providence, 50–78 fath. (*Th.*). Ras Osowamembe, Zanzibar Channel, 10 fath. (504); Wasin, Brit. E. Africa, 10 fath. (500), collected by Crossland.

Valkeria uva (Linnæus).

For synonyms see Waters, "Mar. Biol. of the Sudanese Red Sea, Cyclostomata, Ctenostomata, and Endoprocta," Journ. Linn. Soc., Zool. vol. xxxi. p. 250, pl. xxiv. fig. 13, pl. xxv. figs. 4, 12, 13 (1910); Osburn, "Biol. Survey of Woods Hole and

* Journ. Linn. Soc., Zool. vol. xxxi. p. 239, pl. xxv. fig. 6.
† Ann. Mag. Nat. Hist. ser. 5, vol. xix. p. 311, pl. ix. fig. 8 (1887).
‡ "Études Anat. & Emb. sur le *Pyrosoma giganteum*," p. 106, pl. v. fig. 4 (1888).

Vicinity," Bull. Bureau of Fisheries, vol. xxxi. pt. 2, p. 606 (1911).

The specimens from Chuaka have groups of zoœcia at distant intervals, and there are fully formed embryos in the zoœcia.

Loc. See above and add: Vineyard Sound, 6–8 fath. etc. Chuaka, Zanzibar, 2 fath., on seaweed with *Stirparia dendrograpta* Waters (508); and Chuaka shore, on *Amathia lendigera* (521): collected by Crossland.

Cylindrœcium giganteum (Busk).

Farrella gigantea Busk, Quart. Journ. Micr. Sc. vol. iv. p. 93, pl. v. figs. 1, 2 (1856).

Cylindrœcium giganteum Hincks, Brit. Mar. Poly. p. 535, pl. lxxvii. figs. 3, 4 (1880).

The largest zoœcia from Chuaka are about 0·25 mm. long. There is no dilation at the base, and the contents of the wall are mostly calcareous, giving it a white appearance, so that at first I was inclined to call it var. *album*. When placed in acid it becomes transparent. The determination of *Cylindrœcium* is always very unsatisfactory, and probably *C. giganteum* and *C. dilatatum* have not always been correctly distinguished.

The stolons branch in various directions.

Loc. British; Mediterranean; Red Sea: off Portugal; Ceylon; Cargados; Farquhar Reef (*Th.*); Queen Charlotte Island; Tortugas. Chuaka, Zanzibar, 2 fath. (508); Prison Island, Zanzibar, collected by Crossland.

Buskia nitens Alder.

Buskia nitens Alder, Q. J. Micr. Sc. vol. v. p. 24, pl. xiii. figs. 1, 2 (1857); Hincks, Brit. Mar. Poly. p. 532, pl. lxxii. figs. 6, 7, woodcut, fig. 28 (1880): Ann. Mag. Nat. Hist. ser. 5, vol. xiii. p. (37); Levinsen, "Zool. Danica, Mosdyr," p. 83, pl. viii. figs. 12, 13 (1894).

From Ras Osowamembe, growing on the stalk of *Mimosella bigeminata*, nov. Levinsen says that there are 8 tentacles.

Loc. Arctic; Davis Strait, 100 fath.; British; Danish; Queen Charlotte Island (*H.*). Ras Osowamembe, Zanzibar Channel, 10 fath. (504), collected by Crossland.

Pedicellina spinosa (Robertson). (Pl. IV. figs. 10, 11.)

Myosoma spinosa Robertson, "Studies in Pacific Coast Entoprocta," Proc. Calif. Acad. of Sciences, ser. 3, vol. ii. p. 324, pl. xvi. figs. 1–12 (1900).

There are two specimens from Wasin, which well show most of the characters mentioned by Dr. Alice Robertson. The spines on both the stalk and calyx are stout and long, whereas those on *P. cernua* may be called almost hairs, and the spines are abundant on the one side and absent on the other, the obliquity of the tentacular region also occurs. The number of tentacles is about 14.

The stalk is broad, especially at the base, and is also wide where the calyx is attached, though not so wide as figured by Robertson in many of the figures, but she shows a distinct separation in fig. 4. In the stolon there is a septum pretty near to the stalk on each side of it, and there is a considerable space from stalk to stalk.

The preparation was stained and mounted for some other more transparent species, and it is not suitable for following any muscle from the stalk up the calyx, nor am I able to see anything suggesting it.

While unable to accept the genus *Myosoma* at present, of which I have been unable to make sections, it may turn out that it is advisable to retain the genus.

I now think that the *Pedicellina* from Naples with numerous stout recurved spines, to which I referred *, is *P. hirsuta* Jull.

Loc. Tomales Bay, California, beach; Fort Point and San Pedro, California. Wasin, Brit. E. Africa, 10 fath., with Corallina etc. (500), collected by Crossland.

Barentsia gracilis (Sars).

For synonyms see Waters, "Rep. Mar. Biol. of the Sudanese Red Sea, pt. ii.," Journ. Linn. Soc., Zool. vol. xxxi. p. 251 (1910) and add:—

Pedicellina gracilis Föttinger, "Anat. des Pédicellines de la Côte d'Ostende," Arch. de Biol. vol. vii. p. 300, etc. (1886).

Ascopodaria gracilis Norman, "The Polyzoa of Madeira and neigh. Isl.," Journ. Linn. Soc., Zool. vol. xxx. p. 277 (1909).

Some of the stalks have the swelling in the middle, which have been found from many places, and in consequence of which the species *nodosa* was made. James Ritchie † has confirmed what I have said ‡ as to the genus *Gonopodaria* being superfluous.

Loc. Arctic; European coast, generally; Mediterranean; Red Sea; Madeira; Australasia. Ras Osowamembe, Zanzibar Channel, 10 fath. (504); Wasin, Brit. E. Africa, 10 fath. (500); Chuaka, Zanzibar, "from growth on elytron of Aphroditid"; Chuaka, Zanzibar, 2 fath. (508), (509), (519): collected by Crossland.

Loxosoma singulare Keferstein.

Loxosoma singulare Kef. Zeit. wiss. Zool. vol. xii. p. 13, pl. xi. fig. 29 (1862); and add to Miss Jelly's Catalogue:—

Loxosoma singulare Jull. & Calvet, "Bry. prov. de l'Hirondelle," p. 28, pl. ii. fig. 5 (1903); Harmer, "Struct. and Devel. of *Loxosoma*," Q. J. Micr. Sc. 1885, p. 4.

There are a number of specimens growing on *Schizoporella*

* "Mar. Biol. of the Sudanese Red Sea, pt. ii.," Journ. Linn. Soc., Zool. vol. xxxi. p. 252 (1910).

† "On an Entoproctan Polyzoon (*Barentsia benedeni*) new to the British Isles," Trans. Roy. Soc. Edin. vol. xlvii. p. 835 (1911).

‡ "Résultats du Voy. du S.Y. 'Belgica'—Bryozoa," p. 100 (1904); "Mar. Biol. Sud. Red Sea, pt. ii.," Journ. Linn. Soc., Zool. vol. xxxi. p. 252 (1910).

nivea B., and they are mostly, or at any rate exceeding frequently, attached to the operculum, indicating that the movement gained in this way is favourable to the *Loxosoma*.

Loc. Holland (*Kef.*); Shetland (*Hincks*); Naples (*Harmer, etc.*); Newfoundland (*J. & C.*). Prison Island, Zanzibar Channel, 8 fath. (505), collected by Crossland.

Addendum.

Since I wrote about *Lagenipora socialis* H. in the description of the Cheilostomata from Zanzibar, pt. i. p. 510 (1913), I have examined the Norman Collection, recently sent to the British Museum, and there is a specimen from Hastings, sent by Mr. Hincks to Canon Norman as *Lagenipora socialis*, which has a pore at each corner of the ridge, as I described in the Guernsey specimens.

This entirely confirms the view that *Lagenipora socialis* is the type of the group which I have several times maintained was *Lagenipora*, but which Levinsen has called *Siniopelta*. By this specimen it is now definitely settled, and does not admit of further question, but the examination has brought out another interesting point. The *Celleporella* Norman belongs to the same genus, which, however, Norman at some time recognised, for he wrote on Hincks's co-type of *Lagenipora socialis*, "*Celleporella lepralioides*." However, under *C. lepralioides* he had two species, first the *L. socialis*, and then from Guernsey and from Hardanger Fiord specimens with several pores by the ridge of the ovicell, which are probably *L. lucida*, as well as *L. socialis*, both of which he had identified with *Celleporella lepralioides*. Of course, *Celleporella* has to disappear, as it was not recognisable from the description and figure.

I might have mentioned in the same paper, when speaking of *Aetea*, p. 464, that what I call the bulging out of the zoœcial wall, for the ovum, before the ovicell has been formed, has been figured by Prouho in *Cylindrœcium**.

In looking over seaweed for *Pedicellina* a few zoœcia of *Lepralia poissonii* Aud. have been met with from Wasin, Brit. E. Africa, 10 fathoms. The primary zoœcium has two or three more spines than Levinsen's figures. The species is known from the Atlantic, Australasia, Indian Ocean, and Japan (A. W. W. coll.), and is a common species in many localities. It also occurs fossil.

From Chuaka, 3 fathoms (523), a few zoœcia of *Beania intermedia* Hincks were found. There are no frontal spines, and near the proximal end there is a large plate for the attachment of the radicle, and at each side of this, near the border of the zoœcium either at the same level as the radicle or higher up, there is a

* "Contrib. à l'hist. des Bryoz.," Arch. Zool. Expér. 2me ser. vol. x. pl. xxiv. figs. 14-17 (1892).

tubular projection, and from one of these a new zoœcium may grow. Close up to the distal border on the dorsal surface there is on each side a small pore, which, however, is not seen in the Chatham Island specimens. Now I have previously remarked that most "*Beanie* have six tubular connections, whereas this has only four," so that there is reasonable ground for considering these as vestigial, thus representing six connections. Two pores are found in this position in several Cheilostomata, as *Brettia*, *Catenicella*, etc., and we may, perhaps, now see the significance of these spots or disks.

The zoœcia are about a third larger than those from the Chatham Islands and twice as large as those from New Zealand.

The *B. intermedia* has been found in New Zealand, Tasmania (*H.*), Chatham Islands (*W.*), Red Sea (*W.*), Australia, Indian Ocean.

EXPLANATION OF THE PLATES.

Plate I.

Fig. 1. *Crisia inflata*, sp. n. × 25. From Wasin.
2. Do. do. × 85. Showing ovicell.
3. *Crisia elongata* M.-Ed. × 12. From Wasin.
4. Do. do. Natural size.
5. *Crisia sertularoides* Aud. × 25. From Wasin.
6. Do. do. × 3.
7. *Crisia circinata*, sp. n. × 12. From Ras Osowamembe.
8. Do. do. × about 2.
9. Do. do. × 25. Ovicell seen from the side.

Plate II.

Fig. 1. *Entalophora wasinensis*, nom. n. × 25. Showing ovicell. From Wasin.
2. Do. do. × 50. Section of ovicells containing embryos.
3. Do. do. × 330. Embryo.
4. Do. do. × 85. Section of ovicell containing embryos.
5. *Idmonea interjuncta* MacG. × 12. Showing ovicell with oœciostome (*oe.*). From Ras Osowamembe.
6. *Idmonea radians*, var. *erecta* Busk. × 25. Showing ovicells with oœciostome (*oe.*). From Ras Osowamembe.
7. Do. do. do. × 25. Longitudinal section of the ovicell. Cut parallel to the anterior and dorsal surfaces.
8. Do. do. do. Natural size, showing the position of the ovicells Fig. *a*. *Idmonea radians* Lam. typica. Natural size.
9. *Entalophora wasinensis*, nom. n. × 330. Section of the surface pore-tubes; (*m.*) exterior membrane.
10. *Idmonea radians*, var. *erecta* Busk. × 85. Section from the anterior to the dorsal surface of the zoarium, showing the lobes of the ovicell and the oœciostome (*oe.*) as well as the polypides (*p.*). The structure of the wall of the ovicell is seen at the left (*st.*) with one or two rosette-plates at the base of the broad pore-tube. There is an outer membrane (*m.*).

Plate III.

Fig. 1. *Mimosella bigeminata*, sp. n. × 85. Showing the lower internode with only a pair of zoœcia, while the upper one has two pairs. From Ras Osowamembe.
2. Do. do. × 6. Showing several stems growing from the creeping stolon.
3. Do. do. × 85. Showing a new stem growing from the side of an old one after mutilation.

Fig. 4. *Zoobotryon pellucidum* Ehr. × 250. Embryo in ovisac (*os.*). Zoœcial wall (*zw.*). This shows the embryo hollow, which is very generally the case in embryos of this type.

5. Do. do. × 200. Disk of rosette-plate showing one small pore in the centre.

6. Do. do. × 375. Disk of rosette-plate with a circle of cells round the pore.

7. Do. do. × 700. Section across the rosette-plate showing cells directed to the small opening; with mesenchym cells above. Only two of the radiating cells above the rosette-plate are shown, as the others are only seen in a different focus, but there will be 8 or 9.

8. Do. do. × 330. Section across the rosette-plate in a septum of a main stolon. Showing a spreading plasma with cells scattered about. From the Sudan.

9. Do. do. × 700. Section across the rosette-plate from the stolon to the zoœcium.

10. Do. do. × 330. Section across the rosette-plate; above it there is an irregular granular mass. This is in a zoœcium in which there is an ovarium, and degeneration has taken place.

11. Do. do. × 330. Section across the rosette-plate from a stolon to a zoœcium, showing irregular granular masses in a zoœcium that is degenerating.

12. Do. do. × 330. Section across the rosette-plate from a stolon to a zoœcium.

In all cases the figures show the older part below the rosette-plate, and the younger above.

Plate IV.

Fig. 1. *Amathia vidovici* Hell. × 12. From Wasin.

2. Do. do. × 330. Section where a new branch is formed on each side, showing the cells round the two rosette-plates. The plug of cells on the left are not cut close to the opening of the rosette-plate, and the two inner plugs have become somewhat granular.

3. *Amathia lendigera* L. × 500. Section through the rosette-plate of the septum of the stolon. Examined with 1/12 immersion. From Swanage.

4. Do. do. × 25. Showing the branch at a bifurcation arising almost at right angles to the main stem.

5. *Crisia denticulata* Lamk. × 330. Section through the inner wall of a zoœcium, showing the connections from zoœcium to zoœcium (*c.*). From Swanage.

6. *Crisia elongata* M.-Ed. × 250. Proximal end of zoœcium—(*a.*) showing connection to the two neighbouring zoœcia, through numerous tubes in which there is a septum in the middle, zoœcial walls (*w.*). From Wasin.

7. *Stomatopora*. Primary zoœcium. × 85.

8. *Tervia irregularis* Meneghini. Comb-like process in the zoœcial tube near where it becomes erect. From Naples.

9. *Farrella atlantica* Busk. × 85. From Ras Osowamembe.

10. *Pedicellina spinosa* Robertson. × 85. From Wasin.

11. Do. do. × 25.

12. *Zoobotryon pellucidum* Ehr. Natural size. From Chuaka Bay.